How narrative structures entrepreneurial discovery

How narrative structures entrepreneurial discovery

Adam J. Bock
University of Edinburgh
Business School
29 Buccleuch Place
Edinburgh EH8 9JS
United Kingdom
+44 0 131 650 8246
Adam.J.Bock@ed.ac.uk

Gajendran Kandasamy
Imperial College London
Business School
South Kensington Campus
London SW7 2AZ
United Kingdom
+44 0 20 7594 6427
gaj@ic.ac.uk

ABSTRACT

Theories of opportunity discovery presume a rational world framework to explain entrepreneurial cognition and behaviour. A narrative rationality framework that complements Bayesian logic improves the description and interpretation of entrepreneurial discovery processes. We develop a preliminary theory of discovery which incorporates narrative sense-making. This emphasizes active, contextualized meaning-making during the crystallisation and communication stages of discovery. Extending Fisher's narrative paradigm, we reconceptualise discovery as a dynamic, convergent process based on the coherence-seeking and narrative fidelity. Data from scientists and entrepreneurs grounds the analysis, while *gedanken* experiments facilitate interpretation. We discuss implications for entrepreneurship research and present normative theory for discovery communication.

Key words: discovery, entrepreneur, narrative rationality, opportunity, innovation

INTRODUCTION

The discovery of opportunity is poorly explained by current theories (citation). The challenges to studying discovery are significant. It cannot be predicted or induced, limiting observational data. Participant and observer recall, though powerful tools, suffer from post-hoc rationalization. Quantitative study generally fails to capture the apparently idiosyncratic antecedents and the processes. Because discovery is the heart of entrepreneurial action (Shane and Venkataraman 2000), descriptive and normative theory is essential for explaining differential entrepreneurial behavior (Baum, Frese et al. 2007) and differential outcomes (Rauch, Wiklund et al. 2009).

Despite the importance of discovery to a variety of organizational and economic theories, our epistemological understanding of discovery is rudimentary and rooted in frameworks of formal logic and economist assumptions rather than deduced from mechanisms. In this paper we argue that, compared to the dominant rational world framework that is implicitly employed in most social science research, narrative rationality provides a more grounded, coherent, and useful perspective for understanding, describing, and theorizing about the nature of discovery.

Because observational data on discovery is inherently limited by endogeneity arising from application of cognitive filters and sense-making, we utilize a cognition-in-the-wild approach (Hutchins) to unpack the analytical and interpretative heuristics that underlie the recognition of novelty. Current theories of opportunity discovery presume a rational world framework to explain entrepreneurial cognition and behaviour. We propose that entrepreneurs employ narrative rationality to complement Bayesian logic in the discovery process. Extending Fisher's paradigm(Fisher 1994), we show that discovery processes incorporate *narrative coherence*-seeking heuristic to identify opportunities that "make sense" or "hang together." The convergence to coherence operates against a backdrop of *narrative fidelity*— an assessment against prior experience and beliefs. We develop a preliminary theory of discovery which therefore incorporates narrative sense-making. This emphasizes active, contextualized meaning-making during the crystallisation and communication stages of discovery.

Further, we note that discovery and the communication of discovery share similar characteristics. The narrative rationality framework provides a powerful tool for evaluating the relative importance of coherence-seeking and fidelity through the complete discovery and communication cycle. Data from scientists and entrepreneurs is used to ground the analysis, and

gedanken experiments facilitate interpretation. We identify the key components of coherence and fidelity in the comprehension of novelty. It should be noted that while we emphasize novelty in a commercial sense relevant to entrepreneurship studies, we believe this framework applies to knowledge discovery more generally.

This study presents the first steps towards a more formalized and comprehensive theory of opportunity discovery. Integrating the cognitive and communicative elements of discovery within the narrative framework holds significant potential for explicating the critical antecedants and confounding factors in discovery events. We discuss implications for entrepreneurship research and present normative theory for discovery communication.

THEORY

A traditional explanation of the discovery process is through the four phases: mental preparation, incubation, illumination and verification (Wallace 1926). Mostly notably, The illumination phase suggests that the subconscious is more effective than the conscious mind, which also suggests processes other than formal logic at play. The search and problem solving approach is by far the only approach that has yielded to modeling (Levinthal 1997; Rivkin and Siggelkow 2002) (Gavetti and Levinthal 2000; Gavetti, Levinthal et al. 2005) (Kulkarni and Simon 1988). Empirical investigations of science and creativity can be organized into several overlapping categories such as historical or biographical (Wallace and Gruber 1989), sociological (Latour and Woolgar 1979), computational AI models (Darden 1997), computational process models (Kulkarni and Simon 1988), design process models (Hatchuel, Weil et al. 2005), on-line studies (Dunbar 2000), psychological (Amabile 1983), simulated lab studies (Penner and Klahr 1996), biological (Martindale 1999) and linguistics (Fauconnier and Turner 2002).

Within this context, we specify entrepreneurial discovery as a subset of broader knowledge discovery, characterized by and specific to the argument of induced value theory (Smith 1976). Entrepreneurial discovery is most commonly interpreted through the characteristics of the discovering entrepreneur. These individuals are alternately or simultaneously alert (Kirzner 1997), informed by prior experience (Shane 2000), risk-prone (Caliendo, Fossen et al. 2009), unconstrained by resource planning issues or informed by

processes of resource and goal assessment(Sarasvathy 2001). Integrating the spectrum of opportunity discovery events across characteristics-based or functional process-driven frameworks seems unlikely. Synthesis is hindered, both by the wide spectrum of entrepreneurial action that facilitates multiple interpretations, and by underlying assumption inherent to these theories. This assumption requires entrepreneurs to apply fundamentally Bayesian logic to data interpretation and situational assessment.

There are two critical flaws in applying the rational world framework to entrepreneurial discovery. First, discovery creates new-to-the-world knowledge, so the meaning and understanding of that knowledge is subjective, non-equifinal, and path dependent. Successful entrepreneurs may execute one of many opportunities, perhaps based on prior entrepreneurial experience(Gompers, Kovner et al. 2010). Entrepreneurs may enact hypothetical opportunities in a strategic choice process to gauge potential outcomes(Child 1997). Discovery, then, is not an isolated, supra-rational event. Placed into a strict cognitive framing, even the moment of "eureka" is not instantaneous; it is the activation and self-recognition of knowledge and beliefs, possibly driven by powerful instigations. But the "eureka" is really a novel configuration of knowledge and beliefs that makes sense in a way that prior information did not.

Second, discovery as an individual phenomenon may have subjective meaning but is only realized in an socio-economic context via communication. The latter has been not been captured by the literature as an integral part in the efficacy of discovery.

Narrative, not logic

Human cognitive processes simply cannot be mapped to Cartesian or Bayesian logical functions.. Cognition is neither necessarily logical, a-logical, or illogical. Logic is a formal system that may be applied to outcomes of cognitive processes. But cognition relies on semantic and syntactic representation (citation), which may not incorporate strictly logical relationships. The appeal of formal logic is that it is internally consistent, but internal consistency is not an inherent characteristic of cognition. Opportunity discovery, then, operates within a context of inference and interpretation.

One of the most useful frameworks for understanding cognition is within a framework of narrative rationality. Fisher(Fisher 1994; Fisher 1995) proposes that humans are fundamentally

"narrative animals." In other words, human cognitive processes have been acculturated to incorporate the structure of narratives. Plausibility, rather than perfect consistency, suffices for analysis; sense-making is a more descriptive heuristic than objective learning. Consider the following narrative recollection of the discovery process for the inventor of a hand sanitization technology:

> We basically went around hospitals… I can't really remember the reason we did that. I remember one of the reasons I wanted to do that, being slightly Buddhist... part of what makes humans human is that we should care. If you think about where people's lives are significantly changed, is hospitals…We walked around a critical care facility, it was apparent there were so many things getting in the way of people performing their abilities, doing their job, being happy. It was around that time that MRSA started hitting the news... people were dying all over the place. We've got this cacophony of different problems, let's focus on that. So as industrial designers we looked at the human factors associated with people not washing their hands. Basically, the reason that MRSA is an issue, is because people are human. They forget, they get too stressed, they can't be asked, or are just too busy… We looked at decreasing the barriers to use. It sort of dawned on us that we could make it habitual. So if stress is an issue, let's make it something that people use when they are stressed. That's where we came up with the ball thing, that's going to feel nice... I had been thinking this will never work... we had only made a large-scale prototype... and then I thought, fucking hell, if I don't do something with this, I'm going to regret it.

Numerous characteristics of narrative rationality are present here. There is a convergence to a belief that "makes sense" to the entrepreneur, regardless of whether all the data supports the conclusion or not. This is consistent with the narrative rationality approach(Fisher 1994). There are elements of internal consistency (coherence) as well as the relation to the entrepreneur's prior experience and beliefs (fidelity).

A working definition for discovery

An important contribution of this study to the broader literature of discovery is the derivation of a working definition for discovery. Although the discovery event is commonly be defined as seeing a novel configuration of information, a critical element in realizing that configuration is the crystallization or articulation of information such that the novelty becomes evident to onself and in addition may be presented externally. This is because discovery is identified as one, only when it is successfully communicated and appreciated. Thus we provide the following working definition for discovery: it is a favorable combination of circumstances

that arises via sense-making to novel conclusions that may be communicated without loss of coherence and fidelity. To see how this definition is applied, consider one of the most iconic scientific discoveries- Fleming's discovery of penicillin:

> "[Fleming] was not nearly as excited as you might think, since he had not yet imagined the wondrous life-saving power of this mold. On September 28, he was simply curious. He simply felt this mold was worth a little study." (Haven 1994)

Three facts are worth noting immediately. First, for clarity, Fleming was neither the first to identify penicillin or note its antimicrobial characteristics. But Fleming was one of the first established scientists to come upon the knowledge in a manner that would be identified as a discovery externally. Although full specification and commercialization would wait more than a decade, Fleming ultimately received the most credit for the discovery. Second, although the discovery was serendipitous, it was not in fact truly accidental. The circumstances were not unusual and Fleming's self-acknowledged key contributions were experience and curiosity:

> "It was, however, fortunate that, with the background I have briefly sketched, I was always on the lookout for new bacterial inhibitors, and when I noticed on a culture plate that the staphylococcal colonies in the neighbourhood of a mould had faded away I was sufficiently interested in the antibacterial substance produced by the mould to pursue the subject." (Fleming 1944)

Finally, Fleming acknowledges that far from an isolated event, the discovery was the end-result of a lengthy process of action and thought:

> "After a lapse of fifteen years it is very difficult to say just what processes of thought were involved, but it seems necessary to go back much further than 1928 when the activity of penicillin was first observed." (Fleming 1944)

We see, then, that while the "discovery event" may be bounded within a specific, potentially very short timeframe, it is likely difficult to extract the event out of context and argue that the single moment of observation, or the moment of understanding represent "discovery" in isolation.

The importance of communication

Internal crystallization and its external communicatability are not distinct aspects of

discovery.. The communicatability plays an influential role in the crystallization process, which implies that something that cannot be communicated would not be identified as a discovery. Hence discovery is said to have happened when crystallisation of a communicatable knowledge is realised. To see this, consider two examples of discovery: one real and one thought experiment. In the real example, the nature of the discovery is communicated via a single picture.

> "The concept was derived by my college at the [art school] as a student product, and he didn't think of anything more of it than as a nice piece of design. He just wanted to solve a problem. He exhibited the product at a show at the [art school] and was invited to enter the competition to get into the [university] incubator, he hadn't thought about doing it and in fact he didn't want do it himself, he had no commercial experience or inclination to take anything forward commercially, he was just not interested at all. Nevertheless he put in an application in which was a picture, he didn't actually fill in the form. Being part of the incubator previously, I asked if I could flip through the applications... There's something great about someone putting in a picture as an application. But the product itself is obvious. When you look at it, it's obvious what it is and what it does. What captured me is, when I looked at it, I thought, 'that could recreate a standard, it really could.'"

Imagine, instead, a pre-stone age human exposed, in isolation, to fire, where the local community had no prior experience with fire. The individual might envision a variety of potential implications for the discovery. But imagine that the exposure is purely experiential, and the individual returns to the community without the ability to recreate the phenomenon. Is it a discovery? Surely it is, in a strict cognitive reading, but it seems unlikely that the individual would be able to adequately explain the discovery to anyone else – hence fail to be identified as a discovery.

Towards a comprehensive theory of discovery

The above framework to think about discovery provides the basis to develop a more comprehensive theory of discovery. This adds nuance to the role of prior knowledge (Shane 2000; Gregoire, Barr et al. 2010), where we discuss this as both formal knowledge as well as less formal experience and beliefs. This adds to the search literature by incorporating fidelity as a pre-eminent feature in entrepreneurial discovery. In fact the role of fidelity may outweigh the role of coherence. The relative weighting of coherence and fidelity in discovery and decision making is a valuable area that can be explored. The manner in which fidelity influences coherence and vice versa requires a lower level of analysis, for which principles of deliberative, emotional, perceptual, analogical, conceptual and unifying coherence (Thagard 2000) could be

helpful.

IMPLICATIONS

A narrative theory of entrepreneurial discovery has implications for both organizational scholarship and venturing practice.

Theory:

- nature of opportunities
- enactment of opportunities, shaping, etc.
- resource acquisition depends on sensemaking, communication
- may explain some venture capital processes and outcomes
- metaphor is an example of narrative structure

Practice:

- tools that may model whether discovery "makes sense" – neural network
- importance of storytelling skills for active (rather than passive) sense-making inside the organization
- nature of opportunities linked to how easy/hard to communicate

CONCLUSION

The distinction between the rational and narrative paradigm holds important implications for entrepreneurship research. The narrative paradigm asserts that people are fundamentally storytellers. In this framework, the sense-making heuristic relies on inference to the most plausible explanation rather than Cartesian/Bayesian logic. Because cognition utilizes symbolic actions or words that have sequence and meaning for those who create or interpret them, discovery shifts from a goal-centric insight to a meaning-making process. The entrepreneur develops a story that concurrently describes and rationalizes the purpose and characteristics of the opportunity. Narrative thus structures discovery, imposing mechanisms of sequence, causality, and relevance. Qualitative data from scientists and entrepreneurs demonstrate that structuring discovery appears to be idiosyncratic, contextualized, path dependent, and non-stochastic. Convergence to the meaning of an opportunity depends on a complex interplay of observed data, extant beliefs, and contextual circumstances. Prior experience informs, but does not determine opportunity identification or interpretation.

Although discovery is generated via individual sense-making, narrative structuring also

determines how discovery is communicated to others. Narrative fidelity and coherence determine whether and how opportunity information is transferred. Improving our understanding of this process is important because entrepreneurs use narrative as a legitimating tool to acquire valuable resources. Individual and communicative sense-making therefore vary by locus of novelty and knowledge types. Constructs related to opportunity discovery and communication, such as metaphor, effectuation, and alertness, may then be interpreted as special cases within a broader narrative framework. This is the first step towards a more comprehensive theory of entrepreneurial discovery grounded within theories of cognition and sociology.

REFERENCES

Amabile, T. M. (1983). The Social Psychology of Creativity, Springer-Verlag New York.

Baum, J. R., M. Frese, et al. (2007). "Entrepreneurship as an area of psychology study: an introduction." The psychology of entrepreneurship: 1–18.

Caliendo, M., F. M. Fossen, et al. (2009). "Risk attitudes of nascent entrepreneurs–new evidence from an experimentally validated survey." Small Business Economics **32**(2): 153-167.

Child, J. (1997). "Strategic choice in the analysis of action, structure, organizations and environment: retrospect and prospect." Organization studies **18**(1): 43.

Darden, L. (1997). Recent work in computational scientific discovery. Nineteeth Annual Meeting of the Cognitive Science Society, Lawrence Erlbaum**:** 161.

Dunbar, K. (2000). "How Scientists Think in the Real World Implications for Science Education." Journal of Applied Developmental Psychology **21**(1): 49-58.

Fauconnier, G. and M. Turner (2002). The Way We Think: Conceptual Blending and the Mind's Hidden Complexities, Basic Books.

Fisher, W. R. (1994). "Narrative Rationality and the Logic of Scientific Discourse." Argumentation **8**: 21-32.

Fisher, W. R. (1995). "Narration, knowledge, and the possibility of wisdom." Rethinking knowledge: Reflections across the disciplines: 169–192.

Fleming, A. (1944). "The discovery of penicillin." British Medical Bulletin **2**(1): 4.

Gavetti, G. and D. Levinthal (2000). "Looking Forward and Looking Backward: Cognitive and Experiential Search." Administrative Science Quarterly **45**(1): 113-137.

Gavetti, G., D. Levinthal, et al. (2005). "Strategy-making in novel and complex worlds: The power of analogy." Strategic Management Journal **26**(8): 691-712.

Gompers, P., A. Kovner, et al. (2010). "Performance persistence in entrepreneurship." Journal of Financial Economics **96**(1): 18-32.

Gregoire, D. A., P. S. Barr, et al. (2010). "Cognitive processes of opportunity recognition: The role of structural alignment." Organization science **21**(2): 413.

Hatchuel, A., B. Weil, et al. (2005). Building innovation capabilities. The development of design-oriented organizations. Innovation, learning and macro-institutional changes. J.T.Hage. New York, Oxford University Press.

Haven, K. F. (1994). Marvels of Science, Libraries Unlimited**:** 182.

Hutchins, E. "Cognition in the Wild. 1995." MIT Press, Cambridge **14**: 399-406.

Kirzner, I. M. (1997). "Entrepreneurial discovery and the competitive market process: An Austrian approach." Journal of economic Literature **35**(1): 60-85.

Kulkarni, D. and H. A. Simon (1988). "The Processes of Scientific Discovery: The Strategy of Experimentation." Cognitive Science **12**(2): 139-175.

Latour, B. and S. Woolgar (1979). Laboratory Life: The Social Construction of Scientific Facts, Sage Publications.

Levinthal, D. A. (1997). "Adaptation on Rugged Landscapes." Management Science **43**(7): 934-950.

Martindale, C. (1999). Biological Bases of Creativity. Handbook of Creativity. R. J. Sternberg. Cambridge, Cambridge University Press.

Penner, D. E. and D. Klahr (1996). "When to trust the data: Further investigations of." Memory & cognition **24**(5): 655-668.

Rauch, A., J. Wiklund, et al. (2009). "Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future." Entrepreneurship Theory and Practice **33**(3): 761-787.

Rivkin, J. W. and N. Siggelkow (2002). "Organizational Sticking Points on NK Landscapes." Complexity **7**(5): 31-43.

Sarasvathy, S. D. (2001). "Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency." The Academy of Management Review **26**(2): 243-263.

Shane, S. (2000). "Prior knowledge and the discovery of entrepreneurial opportunities." Organization science: 448-469.

Shane, S. and S. Venkataraman (2000). "The promise of enterpreneurship as a field of research." The Academy of Management Review **25**(1): 217-226.

Smith, V. L. (1976). "Experimental Economics: Induced Value Theory." The American Economic Review **66**(2): 274-279.

Thagard, P. (2000). Coherence in thought and action, The MIT Press.

Wallace, D. B. and H. E. Gruber (1989). Creative People at Work: Twelve Cognitive Case Studies. New York, Oxford University Press.

Wallace, G. (1926). The Art of Thought. New York, Harcourt, Brace.